

REMARKS/ARGUMENTS

Claims 12-17 and 24-29 are pending in this application. By this Amendment, Applicant AMENDS claims 12, 16, and 24.

On page 2 of the outstanding Office Action, the Examiner objected to claims 12 and 16 for allegedly containing informalities, suggesting that the phrase “brazing material foil” should be changed to the phrase “brazing foil.” Applicant has amended claims 12 and 16 as suggested by the Examiner. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the objection to claims 12 and 16.

On page 2 of the outstanding Office Action, the Examiner rejected claims 12-17 and 24-29 under 35 U.S.C. § 112, second paragraph for allegedly being indefinite.

With respect to claims 12-17, the Examiner noted that “the brazing material foil” recited in claim 12, line 4 lacks antecedent basis. Applicant has amended claim 12, line 4 to recite “~~the~~ a brazing material foil.”

With respect to claims 24-29, the Examiner failed to identify why claims 24-29 are allegedly indefinite. Applicant respectfully submits that claims 24-29 comply with the requirements of 35 U.S.C. § 112, second paragraph.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 12-17 and 24-29 under 35 U.S.C. § 112, second paragraph.

On page 2 of the outstanding Office Action, the Examiner rejected claims 12-15 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. (JP 2003-145290) in view of Yasui et al. (U.S. 5,289,965). On page 7 of the outstanding Office Action, the Examiner rejected claims 24-27 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. (JP 2003-145290). On page 8 of the outstanding Office Action, the Examiner rejected claims 16, 17, 28, and 29 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. in view of Yasui et al., and further in view of Ishio et al. (EP 1 068 924).

Applicant respectfully traverses the rejections of claims 12-17 and 24-29.

Applicant's claim 12 recites:

A brazing method for brazing a first member and a second member to be joined via a braze joint, the method comprising the steps of:

preparing the first member and a brazing foil, the first member including a base plate composed of a ferrous material and a diffusion suppressing layer laminated on the base plate for suppressing diffusion of Fe atoms into the braze joint from the base plate during the brazing, the diffusion suppressing layer being composed of a Ni-Cr alloy essentially comprising not less than about 15 mass% and not greater than about 40 mass% of Cr, **the brazing foil being composed of a Cu-Ni alloy essentially comprising not less than about 17 mass% and not greater than about 20 mass% of Ni;**

assembling the first and second members into a temporary assembly with the brazing foil disposed between the diffusion suppressing layer of the first member and the second member;

performing a brazing process by maintaining the temporary assembly at a brazing temperature of not less than about 1,200°C to fuse the brazing foil and diffuse Ni atoms and Cr atoms into the fused brazing foil from the diffusion suppressing layer to form the braze joint, causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint, wherein **the braze joint is free from segregated solidification and is composed of a Cu-Ni-Cr alloy comprising not less than about 34 mass% of Ni** and not less than about 10 mass% of Cr; and

cooling the resulting assembly. (emphasis added)

Applicant's claim 24 recites features that are similar to the above emphasized features recited in Applicant's claim 12.

In Section No. 6 on pages 2-6 of the outstanding Office Action, the Examiner alleged that the combination of Hasegawa et al. and Yasui et al. teaches all of the features recited in Applicant's claim 12. More specifically, the Examiner alleged that Hasegawa et al. teaches all of the features recited in Applicant's claim 12, except for the features that the brazing material is a foil, the exact same ranges as recited in Applicant's claim 12, and the specific results and features of Applicant's claimed step of performing a brazing process to diffuse Ni atoms and Cr atoms into the fused brazing material foil. To remedy these deficiencies in Hasegawa et al., the Examiner relied on Yasui et al., alleging that column 5, lines 5-17 of Yasui et al. teaches a foil material. On pages 5 and 6 of the enclosed Office Action, the Examiner alleged that Applicant's

exact claimed ranges would have been obvious to one of ordinary skill in the art, and that since the method of Hasegawa et al. is allegedly the same as Applicant's claimed invention, the results of the brazing process would also be the same in Hasegawa et al. as what is recited in our claim 12.

In Section No. 7 on pages 7-9 of the Office Action, the Examiner alleged that Hasegawa et al. teaches all of the features recited in Applicant's claim 24. Similar to the Examiner's rejection of claim 12, the Examiner alleged that it would have been obvious for one of ordinary skill in the art to select the overlapping disclosed ranges and that one of ordinary skill in the art would have expected that the disclosed atom diffusion layer 12 and wax material section 13 of Hasegawa et al. to have the same properties recited in Applicant's claim 24 because of the closeness of the ranges in the prior art to Applicant's claimed ranges.

Applicant has amended claim 12 to recite the feature of "the brazing material foil being composed of a Cu-Ni alloy essentially comprising not less than about ~~10~~17 mass% and not greater than about 20 mass% of Ni." Support for this feature is found, for example, in Samples Nos. 2-5 in Table 1 on page 24 of Applicant's Substitute Specification. Applicant has amended claim 24 to recite a similar feature.

First, none of Hasegawa et al., Yasui et al., and Ishio et al. teach or suggest this feature.

On page 3 of the outstanding Office Action, the Examiner alleged that paragraph [0021] of Hasegawa et al. teaches a Cu-Ni brazing filler with 15% or less Ni content. However, as discussed above, Applicant has amended claim 12 to recite that the Ni content of the Cu-Ni alloy of the brazing foil is not less than 17% mass and has amended claim 24 to recite a similar feature. Hasegawa et al. fails to teach or suggest such a brazing foil including a Cu-Ni alloy having not less than 17% Ni content.

The Examiner has relied upon Yasui et al. and Ishio et al. to allegedly cure various deficiencies in Hasegawa et al. However, Yasui et al. and Ishio et al., applied alone or in combination with Hasegawa et al., fail to teach or suggest the feature of "the brazing foil being composed of a Cu-Ni alloy essentially comprising not less than about 17 mass% and not greater

than about 20 mass% of Ni” as recited in Applicant’s claim 12 and as similar recited in Applicant’s claim 24.

Thus, Hasegawa et al., Yasui et al., and Ishio et al. fail to teach or suggest the feature of “the brazing foil being composed of a Cu-Ni alloy essentially comprising not less than about 17 mass% and not greater than about 20 mass% of Ni” as recited in Applicant’s claim 12 and as similarly recited in Applicant’s claim 24.

Second, Applicant’s claim 12 recites the features of “the braze joint is free from segregated solidification and is composed of a Cu-Ni-Cr alloy comprising not less than about 34 mass% of Ni.” Applicant’s claim 24 recites similar features. Contrary to the Examiner’s allegation, none of Hasegawa et al., Yasui et al., and Ishio et al. teaches or suggests these features.

As described in paragraph [0007] of Applicant’s Substitute Specification, Hasegawa et al. (JP 2003-145290 A) discloses that the corrosion resistance of the braze joint deteriorates when the Ni content in the brazing material of the braze joint increases to higher than 25%, as discussed in paragraphs [0011] and [0013] of Hasegawa et al. Further, Sample No. 12 in Table 1 of Hasegawa et al. in which the brazed portion has a Ni content of 28%, which is higher than Hasegawa et al.’s 25% Ni content upper limit but lower than Applicant’s Ni content lower limit of 34%, was given an unacceptable grade C for corrosion resistance, as discussed in paragraph of [0028] of Hasegawa et al. The corrosion resistance of Sample No. 12 of Hasegawa et al. is unacceptable because, although Sample No. 12 of Hasegawa et al. has a high Ni content, Sample No. 12 of Hasegawa et al. is not self-solidified. The liquidus projection for Cr-Cu-Ni ternary alloys, which was provided with the Amendment filed November 17, 2009 and which is discussed on page 11 of the Amendment filed November 17, 2009, shows that Sample No. 12 of Hasegawa et al. at 1250 °C maintains the liquid phase and does not self solidify.

As explained above, the Examiner has relied upon Yasui et al. and Ishio et al. to allegedly cure various deficiencies in Hasegawa et al. However, Yasui et al. and Ishio et al., applied alone or in combination with Hasegawa et al., fail to teach or suggest the features of “the braze joint is free from segregated solidification and is composed of a Cu-Ni-Cr alloy comprising not less

than about 34 mass% of Ni” as recited in Applicant’s claim 12 and as similar recited in Applicant’s claim 24.

Thus, Hasegawa et al., Yasui et al., and Ishio et al. fail to teach or suggest the features of “the braze joint is free from segregated solidification and is composed of a Cu-Ni-Cr alloy comprising not less than about 34 mass% of Ni” as recited in Applicant’s claim 12 and as similar recited in Applicant’s claim 24. Further, because Hasegawa et al. teaches that the Ni content of the braze joint should have less than 25% Ni content, Hasegawa et al. teaches away from Applicant’s claimed invention.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 12 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. in view of Yasui and the rejection of claim 24 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al.

Accordingly, Applicant respectfully submits that the prior art of record, applied alone or in combination, fails to teach or suggest the unique combination and arrangement of features and method steps recited in claims 12 and 24 of the present application. Claims 13-17 and 25-29 depend upon claims 12 and 24 and are therefore allowable for at least the reasons that claims 12 and 24 are allowable.

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

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Reply to the Office Action dated March 4, 2010

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The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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